



Natural Heritage & Endangered Species Program

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Natural Community Fact Sheet: **RICH, MESIC FOREST COMMUNITY**

Community description

Rich, Mesic Forests are nutrient-rich, moderately moist (mesic) hardwood forests that are patchily distributed and restricted to areas of calcareous (calcium-rich) bedrock and alkaline groundwater. The nutrient-rich soils that develop over calcareous bedrock are less acidic than is usual for New England, and they typically have a high calcium content that supports a plant community with a diverse and distinct flora.

The terms “rich” and “mesic” are used as modifiers to describe variants of communities that have either more nutrients (“rich”) or more moderately moist soils

(“mesic”) than are usual for the typical occurrence of the basic community type. When “rich” and “mesic” are used together as we do here, they are used to describe a variant of northern hardwood forests where sugar maple is dominant, often with basswood as an important co-occurring species, and where there is a diverse herbaceous layer with abundant spring ephemerals.

Rich, Mesic Forests have a tall (often >20 m), full tree canopy, and a sparse subcanopy and shrub layer. They have an unusually diverse herbaceous assemblage that can include more than 100 different species, many of which are spring ephemerals that complete all or most of their annual growth cycle during the brief period of high light, water and nutrient availability after spring snowmelt and before leaf-out and canopy closure. Rich, mesic woods are considered a climax forest community meaning that without major disturbance, the community will maintain itself. The dominant tree species are very shade-tolerant and able to establish and grow under low-light conditions of a full canopy. The ability to root sprout further enables the dominant overstory tree species to persist.

Environment

Rich, Mesic Forests are found on slopes or talus below calcareous bedrock (such as marble, sandstone or limestone) or on level areas where calcareous bedrock is near the surface. They are restricted to low to moderate elevations below 2,400 ft. and usually occur on north or east-facing,



Forest floor showing spring ephemerals in Rich Mesic Forest. Photo: B.A. Sorrie, NHESP.

concave, middle to lower slopes that experience downslope movement of nutrients and organic matter.

Soils are humus-rich, meaning they contain abundant decomposed organic material in the surface layers, and high in nutrients; they are moist, but not saturated and there is a marked absence of flooding. High soil nutrient concentrations are related both to nutrient-leaching from the underlying calcareous bedrock and to nutrient-loading from leaf litter. Whereas most trees reabsorb nutrients from their leaves prior to leaf-fall, sugar maple and basswood leaves retain their nutrients creating a rich leaf litter in autumn. Basswood leaves have especially high concentrations of nitrogen, calcium, magnesium and potassium. Abundant worms and snails found in rich, mesic forest soils aid in breaking down leaf litter, and a high soil pH facilitates microbial activity and rapid decomposition. Sugar maple and basswood leaves also have fewer tannins than other deciduous leaves making them easier to breakdown by soil microorganisms.

Characteristic plant species in MA

Sugar maple (*Acer saccharum*) dominates the overstory of Rich, Mesic Forests, sometimes to the near exclusion of other tree species. White ash (*Fraxinus americana*) and basswood (*Tilia americana*) can also be abundant; bitternut-hickory (*Carya cordiformis*) and elms (*Ulmus* spp.) occur in lower numbers; and Butternut (*Juglans cinerea*) is uncommon but characteristic. Although Rich, Mesic woods often occur within or adjacent to hemlock woods and oak forests, Rich, Mesic Forests are characteristically without conifers and oaks. The subcanopy is typically sparse and dominated by saplings of the overstory tree species. Hop-hornbeam (*Ostrya virginiana*) and alternate-leaved dogwood (*Cornus alternifolia*) can be abundant. Leatherwood (*Dirca palustris*) is a shrub that occurs only occasionally, but is a good indicator of the community.

In general, the herbaceous layer is made up of large numbers of ferns, sedges, lilies and buttercups; and relatively few grasses, roses, legumes, mints and composites. Spring ephemerals (early flowering plants with foliage that disappears in late spring) are characteristic, and they include wild leek (*Allium tricoccum*), toothwort (*Dentaria diphylla*), squirrel corn (*Dicentra canadensis*), Dutchman's breeches (*Dicentra cucullaria*), and spring beauty (*Claytonia virginica*). Other typical herbaceous species are early-bloomers, but unlike spring ephemerals, they retain their leaves into summer. They include: blue cohosh (*Caulophyllum thalictroides*), sharp-lobed hepatica (*Hepatica nobilis* var. *acuta*), wild ginger (*Asarum canadense*), large-flowered bellwort (*Uvularia grandiflora*), red trillium (*Trillium erectum*), waterleaf (*Hydrophyllum virginianum*), and bloodroot (*Sanguinaria canadensis*). Maidenhair fern (*Adiantum pedatum*), Goldie's fern (*Dryopteris goldiana*) and glade fern (*Diplazium pycnocarpon*) are common ferns of the community.

Rare plant species

Hitchcock's sedge (*Carex hitchcockiana*) (SC), millet grass (*Milium effusum*) (T) and American ginseng (*Panax quinquefolius*) (SC) are rarities that occur almost exclusively in rich, mesic woods. Other state-listed plants that occur in the community are hairy agrimony (*Agrimonia pubescens*) (T), handsome sedge (*Carex formosa*) (T), autumn coralroot (*Corallorhiza odontorhiza*) (SC), fragile rock-brake (*Cryptogramma stelleri*) (T), golden seal (*Hydrastis canadensis*) (E), broad waterleaf (*Hydrophyllum canadense*) (E), and barren strawberry (*Waldsteinia fragarioides*) (SC). Long-spurred violet (*Viola rostrata*), which is found in Rich, Mesic Forests and floodplain forests, is not currently state-listed, but it is on the state plant "Watch List."

SC=State Special Concern, T=State Threatened, E=State Endangered

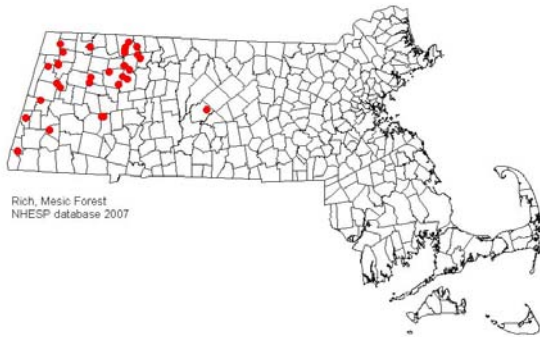
Characteristic animal species in MA

There are very few animal species strongly associated with Rich, Mesic Forests to the exclusion of other community types. One species that is specific is the West Virginia white butterfly which feeds exclusively on toothworts as a caterpillar. A number of bird species are common breeders in Rich, Mesic woods, including wood thrush, veery, ovenbird, black-and-white warbler, Louisiana woodthrush, red-eyed vireo, scarlet tanager, pileated woodpeckers and barred owls.

Rare animal species

Most of the state-listed animal species that occur within Rich, Mesic Forests are found in associated woodland vernal pools. They include: Jefferson salamanders (*Ambystoma jeffersonianum*) (SC) which require vernal pools for breeding, and surrounding upland, deciduous forests for foraging and hibernation, Wood turtles (*Clemmys insculpta*) (SC) and Four-toed salamanders (*Hemidactylium scutatum*) (SC). Rare animal species that occur in Rich, Mesic woods but are not associated with vernal pools are: the Eastern Veined White butterfly (*Pieris oleracea*) (T) (the caterpillars feed on toothworts (*Dentaria* spp.) typical of Rich, Mesic Forests), and the Black rat snake (*Elaphe obsoleta obsoleta*) (E) which prefers moist forests and associated rocky outcrops, particularly on north and east-facing slopes.

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Range in MA

Rich, Mesic Forests as described here occur in calcareous areas from the Great Lakes states east to New England. The most extensive examples in the Northeast occur in Vermont, Berkshire Co., Massachusetts, and Litchfield Co., Connecticut. There are local occurrences in Maine and New Hampshire on calcium-rich bands of diabase and amphibolite in igneous rocks, and in New York in the Hudson and Mohawk valleys and on small, calcareous outcrops in the Adirondacks.

In Massachusetts, the best and most extensive examples occur in the western part of the state where there is calcareous bedrock and locally elsewhere in the state on slopes below calcareous outcrops. Good examples of the community can be found in the Green River Forest in Greenfield (Franklin Co.), on Maple Hill WMA, West Stockbridge (Berkshire Co.) and on Mt. Toby in Sunderland and Leverett (Franklin Co.).

Threats and Management Recommendations

Although rich, mesic forest communities may be secure globally, they are threatened in Massachusetts due to logging and housing and industrial development. Logging (usually for sugar maple) negatively impacts the community both directly by changing species composition and indirectly by altering soil structure, light availability and nutrient cycling. Because the characteristic species of Rich, Mesic Forests are able to regenerate under shaded, full-canopy conditions, the community is self-maintaining as long as the canopy remains closed. When it is opened and more light enters the understory, faster-growing, shade-intolerant taxa can establish,

including invasive, non-native species such as Japanese barberry (*Berberis thunbergii*), Oriental bittersweet (*Celastrus orbiculatus*) and shrubby honeysuckles (*Lonicera* spp.). Not only does this immediately change the species composition it also results in feedback effects by altering nutrient cycling, e.g. less leaf litter from nutrient-rich sugar maple leaves results in lower soil nutrient availability. Perhaps the most detrimental effect of logging is soil disturbance and compaction. Good soil structure is necessary to maintain the nutrient and water availability requirements of rich, mesic plants. Soil compaction impedes nutrient and water movement by decreasing pore space.

Rich, Mesic Forests can probably recover from logging activities if appropriate practices are used and if soil compaction and disturbance are avoided. Cutting should not take place in the spring when soils are wet and highly susceptible to disturbance and when spring ephemerals are flowering. Most of the state-listed plants that are found in Rich, Mesic Forests occur in seepy areas at the base of rocky slopes or on the slopes themselves, which are often unstable and easily disturbed; therefore, cutting on slopes and directly at the base of slopes should be avoided.

Due to the threats to Rich, Mesic Forests and to their scarcity in the Commonwealth, the Massachusetts Natural Heritage & Endangered Species Program describes the community as a Priority Natural Community for protection and good examples of the community are tracked.

Map update 2007. JBK 1997

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